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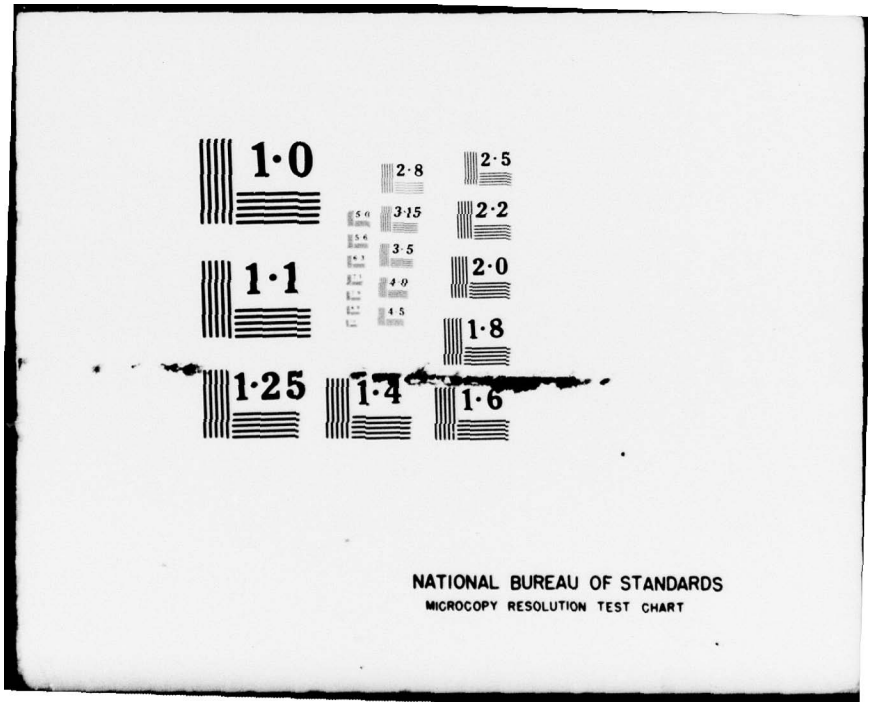
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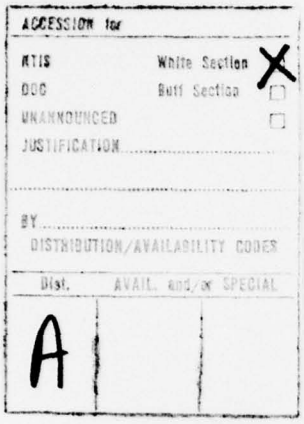
Charles L. Clark
GS-12 DAFC



A STUDY OF SELECTED ENGINEERING INTERFACES IN THE PROCUREMENT PROCESS

An Executive Summary
of a
Study Report
by

Charles L. Clark
GS-12 DAFC

May 1973

Defense Systems Management School
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DEFENSE SYSTEMS MANAGEMENT SCHOOL

STUDY TITLE:

A STUDY OF SELECTED ENGINEERING INTERFACES IN THE PROCUREMENT PROCESS

STUDY PROBLEM/QUESTION:

What are some considerations of the engineering and procurement interface in system acquisition that are significant and how should they be handled?

STUDENT REPORT ABSTRACT:

This study paper examines interfacing relationships of the government engineer in three selected areas of the procurement process. In the areas of solicitation, negotiation and litigation the roles and motivations of both functions are examined in the light of the weapon system acquisition process. The proposition is set forth that proper understanding of certain considerations in these interface areas by both functional groups can contribute to higher quality procurement thus enhancing program success. The proposition is supported by illustrating the need for certain cooperative actions and highlighting the results if accomplished.

KEY WORDS: MATERIEL ACQUISITION SYSTEMS ENGINEERING SPECIFICATIONS PROPOSAL EVALUATIONS

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EXECUTIVE SUMMARY

This study paper examines interfacing relationships of the government engineer in three selected areas of the procurement process. In the areas of solicitation, negotiation and litigation the roles and motivations of both functions are examined in the light of the weapon system acquisition process.

The proposition is set forth that proper understanding of certain considerations in these interface areas by both functional groups can contribute to higher quality procurement thus enhancing program success. The proposition is supported by illustrating the need for certain cooperative actions and highlighting the results if accomplished.

The paper purposely does not rely on regulatory citations or other expressions of authoritative direction that exist in the areas covered. The author has attempted a distillation of the literature and guidance available into a work that makes prima facia good sense.

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The author wishes to express his appreciation to personnel of the Directorate of Procurement Policy, Hq USAF, Systems Procurement and Directorate of Procurement Policy, Hq AFSC, Procurement Committee, for participating in discussion of the subject matter contained herein.

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A STUDY OF SELECTED ENGINEERING INTERFACES IN THE PROCUREMENT PROCESS

STUDY REPORT

Presented to the Faculty

of the

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in Partial Fulfillment of the

Program Management Course

Class 73-1

by

Charles L. Clark
GS-12 DAFC

May 1973

Contents

A Study of Selected Engineering Interfaces in the Procurement Process*

I Introduction

The engineering and procurement process as it relates to weapon systems acquisition in the Department of Defense is analyzed in three isolated instances. These three instances are at points in both processes where a maximum of interface occurs. These three interfaces, the solicitation process, the negotiation process, and the area of litigation are certainly not the only interfaces of the two functions. They are, however, areas of such significance that much benefit can be gained for the acquisition process in their study and understanding by project management personnel.

The literature of purchasing in the commercial and industrial realm of business is quite explicit on the required interdependency of the two functions. The cooperation is described chiefly as being concerned with matters of product design and specification of quality. In the matter of government systems acquisition the role of the engineer is much more pervasive. The case can even be advanced that procurement exists solely to support engineering rather than the traditional mutually supportive roles. It is perhaps because of this imbalance of perceived functional worth that the direction of perspective for

*ABSTAINER

This study represents the views, conclusions and recommendation of the author and does not necessarily reflect the official opinion of the Defense Systems Management School nor the Department of Defense.

the topic at hand should come from the procurement field.

It is, therefore, the intention of the author to set forth engineering and procurement interactions in the selected areas that will improve the overall system acquisition process. The causal factor of this improvement will be higher quality procurement based on more effective engineering interface in the procurement process.

Highlighted will be those areas unique to the government acquisition process. The considerations and responsibilities falling on individuals and functions when the government removes itself from its soverign position and enters the market place will be considered. The benefits to government that can be derived from an effective interface in terms of cost schedule and program success will hopefully become apparent.

II The Solicitation Process

This interface of the buying and technical process within the Department of Defense relies heavily on identification and description of needs. Most viable businesses come into being and remain successful based on providing a product to the market place at a time when it is needed or desired. The business firm accepts the responsibility of identification and description of the needs of the market place and its success in doing this is measured in terms of product sales. In the acquisition of new weapon systems the government removes this factor from the free enterprise system and accepts the responsibility of specifying its products, in kind, quality and quantity. The ramifications of this aspect of government acquisition are sometimes obvious

and quite often more subtle. One obvious consequence of this circumstance is the non-recognition by the government of marketing expenses on government sales.

The removal of this initiative from the free enterprise system imposes on the government technical and buying process the responsibility to fill this void in a manner that is at least a level baseline for firms in the industry. Having taken away from the business community one of its major competitive factors, that of determining the needs of the market place, the government must replace it with an identification and description of its needs that is realistic, adequate and presented in a forum of equality. The degree to which this is accomplished in any specific acquisition is a function of the engineering and procurement interface. The technical and procurement regulations and policies governing development of specifications, control of information, and conduct of the solicitation process exist to fulfill this responsibility to industry.

The drafting of real and adequate specifications poses a technical challenge that should be satisfied by a piece of original technical work. The technical identification and description of the government's need must be a model of accuracy. It must translate to industry exactly what the government has determined will satisfy its needs. It must be consistent with sound engineering principles, so that the reader understands the nature and scope of the task to be performed. The testing specified must be tailored to accomplish the objectives established for the product. The specification, statement of work,

or whatever method of describing the government technical need used is the germ or inceptive device of a new product. A good specification will be the product of genuine technical talent and will represent a word picture of the mental concept held by the engineer and translated by his skill in the technical disciplines.

It is the conduct of the solicitation with the engineering specification at its heart that provides the required forum of equality. At this stage of the acquisition the procurement process sets in motion the events necessary to state its needs to industry. And because of the seriousness with which both industry and government view the transfer of requirements identification from seller to buyer the process of solicitation is quite structured. It possesses a legal rigidity for the protection of both parties since the requirement identified has not resulted from the firm's own initiative and entrepreneurship. The procurement and technical process having released to the business community its solicitation should retire from the scene and allow the inherent and individual capabilities of the firms to determine responses. This can seldom if ever be done. The natural inclination of an individual or organization in problem solving is to seek information. The government has established itself as the single visible source of information on the need to be satisfied. It has further identified in its solicitation the criteria upon which it will judge the adequacy of the proposed product. No longer is the firm in its natural environment of deciding to market a product based on its own assessment of the need. Nor can it rely on numerous buyers

in the market place to establish selection criteria on a simple buy-no buy decision. The entire demand is embodied in a single customer who not only specified in his own way what he wanted but is also reserving solely to himself the determination as to what satisfies his need. Under these conditions the desire for more information by the firm is significant. There is also on the part of the government a desire not to be too far removed from the industry at this time. On the part of the engineer the time has come for him to reveal to his technical peers the results of his efforts. This represents an exposure that will result in an assessment of his own technical success or failure. Success will be reflected in understanding and responsive design proposals. Failure will be measured by confusion and erroneous design approaches. The procurement individual, for his part, is also concerned with the adequacy of the information available to prospective offerors. His desire is that sufficient information is available to maximize the number of firms able to and desiring to submit proposals.

Thus there is a tendency on the part of all concerned to want a maximum flow of information at this time and a reluctance to permit the outcome of the solicitation rest solely on the written word of the documents. This tendency must be recognized and dealt with in a positive manner by assuring that the transfer of all information is accomplished only for valid reasons and in a manner equal to all parties.

The evaluation of technical proposals and selection of the source most likely to translate the stated needs into a product of military

worth is the payoff of the solicitation process. This evaluation and the judgements made in selecting an acceptable source or sources is a major technical challenge. It must be executed in the context with which the original specification was prepared. That document was an original piece of technical work, molded by reasoning, logic and the proper application of the technical disciplines. Therefore, the evaluation of its interpretation by the industrial technical community must also be precise, impartial and reflective of genuine technical effort. Reading of technical proposals by engineering personnel capable of understanding them is not sufficient. The validity of the technical and design approach must be judged on the basis of reasoned study. Deviations and shortcomings must be evaluated for impact on system performance and the relative importance of each considered in the light of the solicitation and its expressed evaluation criteria. These answers are not known intuitively. The concepts must be studied and compared against existing research data. The technical evaluator must satisfy himself by the use of all the skills he has available that when he makes source recommendation he accepts the responsibility of placing his own technical reputation on the line. This is not the time to leave either his superiors or the contracting officer in doubt as to which proposal or proposals match up with the technical concept he had when he wrote the specification. His reasoning and evaluation should also have included a comparison of his technical concept with what he has learned by means of exposure to several different interpretations of concept. Has anything new been revealed that wasn't

originally considered, or should the technical requirements be changed in light of additional knowledge? The evaluation conducted in an atmosphere closed to possible change effects a disservice on all involved. For when the procurement process moves out from this critical interface a major parameter of the acquisition is set. It is from this point that the best buy or value judgements take place that often have the consequence of program success or failure. The following section will deal with the value and monetary considerations of the engineering and procurement process but one final aspect of the solicitation process should be brought out. When arrived at, the final technical recommendation is binding on the procurement process and should be definitive. Just as procurement cannot determine the technical requirements it should not be left the latitude of determining who successfully met those requirements. The technical recommendation is a serious responsibility not only in light of actions that will now be accomplished but also in terms of the resources expended by all participants in the solicitation.

III The Negotiation Process

The engineering interface in negotiations can be especially fruitful if both the engineer and procurement official recognize and take advantage of the opportunity. The engineer must perceive his role in the acquisition process as more than a reviewer of industry technical proposals. By the time his recommendation of technical acceptability is prepared he should consider himself an expert on the proposed design approach. He should be fully capable of making valid judgements on such cost matters as type and quantity of engineering labor proposed. And a review of a priced bill of material should correlate closely with what his own judgements indicate he would need to build this item he has conceived. By the same token the contracting officer must realistically seek pricing support. To ask the engineer if he thinks $500,000 is about right to do the job is nonsensical. However, to ask what the engineer's technical judgement is concerning the application of two man-months of design time to accomplish the work described on page 38 of the proposal is not. To fully explore the opportunities presented by the technical and procurement interface in negotiations requires detailed and assiduous effort. A few of the practical areas and techniques most beneficial are incentive structuring, cost analysis and impact interpretation of changes.

The established parameters in the Systems Engineering Plan for the Technical Performance Measurement program are prime candidates for contract incentives. The criteria for both are quite similar. The

parameter must be important, measurable and have a predictability of tolerances. It will be quite productive for the engineer to participate fully with the contracting officer in establishing performance incentives based on his Technical Performance Measurement program. The engineer's participation in incentive structuring need not be limited to performance areas, however. In structuring the basic incentive on cost the critical starting point is establishment of the range of incentive effectiveness. This band of cost risk can very effectively be measured by technical personnel able to make qualified judgements on possible variations for direct cost inputs. The arithmetic of overhead application and summing the variations in cost elements can then be very handily accomplished by the contracting officer. A negotiation of the cost incentive based on a realistic and reasoned determination of the range of incentive effectiveness could add significantly to final cost results of contract performance.

Participation by the engineer in the basic cost analysis of a proposal containing a great deal of development work is essential. While price analysts and cost estimators have become quite proficient in evaluating cost elements for which any history or standard can be developed there is no substitute for the judgement of the engineer when new technology is involved. The natural tendency of the technical person to remain aloof from this area of the acquisition must be overcome by the procurement official in a manner that recognizes certain pitfalls. The engineer is already being held responsible for the validity of his technical judgement as to the suitability of the

proposed approach. He is now being asked to render input for costing a product that is risky at best from a performance standpoint. His technical judgement is quite validly his own and can be subject to little second guessing by management or procurement because of their lack of expertise. However, in the arena of monetary considerations these functions consider themselves expert. There is a drive for preciseness that appears so comfortable when working with a finite measure such as dollars. So the engineer is confronted with a dilemma of having to quantify his technical position in terms that are too precise for what is being measured and in a manner for which he is not trained. Further, the deeply technically oriented person is really not that concerned with cost since it is the advancement of the state-of-the-art that he considers important. Therefore, to legitimately utilize the engineer for technical cost analysis procurement must assume an interpretive role. The familiarity with cost proposal build up must be utilized to decompose those elements that the engineer can reasonably evaluate based on his technical expertise. They must be presented in such a way that it is clear the same degree of qualification and risk exist in the technical judgement on cost as existed in the original performance predictions.

The engineering interface in the negotiation process can be either prior to the face to face discussions or at the negotiating table. The most necessary participation is in the preparatory stages mentioned above. A number of other considerations are involved when the engineer is to participate at the table. The protocol the team

leader intends to follow must be set forth and rigidly followed. A breakdown of team discipline can have serious effects on a negotiation from the standpoint of strategy and control. It is the responsibility of the contracting officer to establish his intended protocol and enforce it. If he accomplishes this the use then of engineering and other support personnel in the negotiating discussions can be useful and productive, especially as an offset to the contractor's technical representation.

When negotiations have been completed and an acceptable agreement has been reached there ensues a period of time needed for legal and procurement review of the proposed contractual arrangement. For everyone except the procurement official this is what is known as the "after-the-handshake slump". It is during this period that the quality control process established on the expenditure of public monies checks and double checks the procedures utilized and decisions made in the acquisition to this point in time. Since it is not always possible for the contracting officer to satisfactorily defend and rationalize the many decisions that have been made, the engineer should also be able to interface here. He should be able to provide positive substantiation and verification of positions he has taken on matters within his responsibility. Effective interface in this area will do much to reduce administrative time charged to the procurement process.

IV The Litigation Process

The most common engineering interface with procurement in what can be called litigation will be in the areas of formal protests, disputes under terms of the contract, and hearings before the Armed Services Board of Contract Appeals (ASBCA). The function of the engineer in these activities will normally be that of a technical expert and detailer of facts. This arena like no other the engineer will deal with will operate in certitudes rather than judgements. The engineering pronouncement will be held as fact, provable or disprovable, based on the weight of the evidence and counter argument. The impact of these pronouncements will be significant since this area of the procurement process is not entered unless the outcome is of critical importance to the parties involved.

Prerequisite for engineering involvement in this interface is naturally the existence of some technical question. And this is not as infrequent as might be imagined. Despite the numerous procurement regulations and prescribed business practices that would seem to provide the ample basis for protest or dispute, it is becoming increasingly evident that the government's specifications and technical conduct are particularly susceptible to the litigation process. Whether this is because more and more of the government's significant procurement actions are involved in development work or whether there exists an inherent weakness in the technical processes making them particularly vulnerable is the subject of another study. Suffice it to say here that the interfaces examined in this section do exist and appear to

be increasing.

Participation in the formal protest procedures by the engineer will require a type of responsiveness that is both foreign and natural to his mental processes. The identification and isolation of the particular technical feature under protest is in line with his normal problem solving abilities. It is in the area of determination of disposition that the nature of the engineer rebels against the exactitude required by the contracting officer. In making disposition of a protest the contracting officer prepares and signs his statement of facts and findings. In regards to a technical matter his findings must be based on facts provided by the technical community. The facts must be clear, precise, documented and signed by a member of the technical community. Not only is this documentation the basis upon which the contracting officer renders his findings as to the merit of the protest, it is the prime supportative evidence upon which the General Accounting Office will pass judgement. The definitiveness with which the engineer prepares this documentation cannot be overemphasized. The creation of a reasonable doubt that the government is unsure of its technical position will provide for remedy to the protesting contractor.

The involvement of the engineer in contract disputes is also a peculiar arena. One major area involves a disagreement over technical performance required, whether based on interpretation of specifications or test results. The responsibility of the engineer in these matters will be similar to the documentation required under the protest procedures. Recognition must be given to the fact that the documentation

could well form the basis of sworn testimony and the more firmly based on provable facts or exhibits the more prepared the engineer will be against such an eventuality. Another prime consideration the engineer must keep in mind while working with the procurement process is an area of litigation becoming known as the "doctrine of constructive changes". The engineer by the nature of his working relationship with the contractor is especially susceptible to the pitfalls of this increasingly popular dispute area. The hazards incumbent in this doctrine are especially profound to the individual engineer. No longer is he defending an anonymously authorized specification or general technical policy. No longer does he find himself comfortably a member of a team participating in the defense of a team position. In this arena he can find himself isolated and identified as the individual responsible for the matter under dispute. Not only is he being held responsible for faulty technical work, since good technical input or advice probably leads to success and no dispute, he is charged with doing it in an unauthorized and perhaps unlawful manner.

The procurement and engineering interface can really fall apart in this area. The best that can be accomplished aside from arguing the facts of the case is for the contracting officer to diligently explore offsetting failures of the contractor in other performance areas. There is perhaps no stronger argument for understanding the procurement process and the deep underlying responsibilities of the engineer than the realization of the ultimate accountability imposed by the process.

In the litigation area of the procurement process the engineer will very likely find himself required as a witness in hearings before the Armed Services Board of Contract Appeals. While the Board is an administrative arm of the Secretary of Defense, hearing procedures are quite similar to the courtroom of the judiciary. The rules of evidence are in force and testimony is taken under oath. The government attorney preparing for the hearing will thoroughly prepare witnesses for the purpose of introducing pertinent facts. It is imperative that testimony given remain germaine to the line of questioning introduced. In the matter of hearings as with the other subjects discussed here concerning the procurement process there is no substitute for recognizing who is responsible for various parts of the process and the interface considerations.

V A Thought on the Program Manager Interface

The purpose of this concluding part is not to consider the relationship between the Program Manager and either the engineering function or the procurement function. Rather it is to set forth the proposition that as a manager of both functions, he should be aware of the interfaces between the two functions and understand these interrelationships and the responsibilities inherent in each. Of all the functions the program manager will attend to none will have such a direct bearing on program success as these two.

One of the most demanding management tasks to be addressed by the program manager will be to constructively influence the engineering element with the external influences of the program environment,

particularly cost and schedule. Similarly, one of the most important liaisons of the program office will be with the industry. The legal and primary vehicle of this liaison is the procurement process and the contract. He must then, as manager, blend his needs for accomplishing program objectives with the interactions these elements will bring to bear on his resources and technical work direction.

BIBLIOGRAPHY

Abbett, R.W. Engineering Contracts and Specifications. New York: John Wiley & Sons, Inc., 1967.

Aljian, G.W. Purchasing Handbook. New York: McGraw-Hill Book Co., 1966.

Heinritiz, S.F. and Farrell, P.V. Purchasing: Principles and Applications. New Jersey: Prentice-Hall, Inc., 1971.

_____, 1972 Government Contracts Guide. New York: Commerce Clearing House Inc., 1972.

United States General Accounting Office. Government Contract Principles. Washington D.C., Government Printing Office.

Clark, C.L.
A study of selected engineering interfaces in the procurement process